Progress in the Department of Metallurgy

By Prof. D. J. Demorest

When a representative of the staff of The Ohio State Engineer asked us to write up the new things in the Department of Metallurgy our aversion to publicity was overcome by the fact that the students and the Alumni had the right to up-to-date information about this Department, and The Ohio State Engineer is obviously the logical vehicle for carrying such information.

We might as well state in the beginning that we have some very interesting and useful new equipment, but along with this statement we wish to express a warning, it is this: It is very easy for students and the Faculty also to get too much interested in large scale equipment and spend too much energy in its manipulation and operation neglecting to get that kind of concentrated thought requisite to a proper grasp of the essential fundamentals of science in engineering. If these fundamentals are not thoroughly grasped by a student he might about as well not come to the University because he can learn how to manipulate furnaces and machines in an industrial works and get paid for it, even though he never acquires the knowledge of the principles involved sufficient to become what is properly termed an engineer.

Having, we hope, made this point clear, let us see what interesting acquisitions have come to the Department in the last year or so.

Perhaps, the thing that has proved of most interest to us this Spring, is our electric steel furnace. Just at present the electric furnace is very fashionable in Metallurgy, but it might be said in passing that fashions have some potency even in the industrial world, although they have some reasonable basis for their existence.

There are as many types of electric furnaces almost as there are breeds of cattle and between some of these types as little difference as between some breeds of cattle, but in general electric furnaces may be classified as arc, induction and resistance furnaces. Ours is an arc furnace.

The furnace takes its power from the two phase 60 cycle 1100 volt generator in the University power house. This power is translated to the furnace in Lord Hall over a four wire system connected to two 50 K. W. transformers which reduce the voltage down to 110 volts. The furnace is connected to the transformers through a switch board which is equipped with circuit breakers and ammeters for each phase and a voltmeter. The furnace is equipped with four electrode holders using two inch graphite electrodes. These electrodes are connected with the switch board in such a fashion that the furnace can be operated with two electrodes on single phase or with three electrodes on two phase or four electrodes on two phase and the arcs can be either direct or indirect or both, that is, the arcs can be from electrode to bath or from electrode to electrode or both.

This furnace is a tilting furnace operated by hand using a crank and the electrodes are adjusted by hand since automatic regulation of the electrodes on a furnace of this size is not practical. Furnace is designed with a capacity sufficient 200 pounds of molten steel. Numerous runs have been made and it has been found to be quite easy to melt, say 100 pounds of pig iron or steel in an hour and a half, starting with the furnace stone cold and using 500 amperes at 108 volts. After this melting the steel can be refined or alloyed according to whatever is the purpose of the run. The class of six or eight seniors who operate the furnace are getting a great deal of interest and satisfaction out of their experiences with it.

We hope soon to have a Booth rotating electric furnace added to our equipment.

Another interesting new equipment belongs to our non-ferrous metallurgy work. It is a zinc fuming furnace of the Wetherill type with a bag house for collecting the zinc fume. In the metallurgy of zinc the Metallurgist and Chemical Engineer as indeed in most branches of Metallurgy are not very sharply differentiated for the industrial developments in zinc have made zinc oxide about as important as metallic zinc; without zinc oxide the price and quality of automobile tires would receive a hard blow. A friend of the Department who is much interested in the metallurgy of zinc has made a gift to us of this equipment which is of sufficient size to carry on the zinc smelting on a semi-commercial scale, and will make a beautiful piece of apparatus for thesis work.

The third item and the last one we will have space to describe in this article was secured by a special act of the Legislature through the University Engineering Experiment Station and is for a specific purpose.

By way of introduction it should be stated that the natural gas supply of this state is rapidly becoming insufficient and that the Ohio cities are faced with the necessity of putting in artificial gas plants very soon. It has therefore become a matter of very great importance that data be obtained on the gas and by-product making qualities of the various seams of Ohio coals. To do this the Department of Metallurgy through the Engineering Experiment Station asked for funds to purchase equipment for large scale carbonization and gasification of coal. This equipment has been purchased and is being supplied by the United Gas Improvement and Contracting Company of Philadelphia and it is hoped that it will be installed by the first of June. This equipment consists of a full sized one ton vertical retort, such as is used for making artificial gas for Rochester, New York and the proper scrubbers and purifiers for purifying the gas produced and obtaining the by-products such as ammonia, tar, benzol, etc. We have about thirty large samples

(Continued on page 26.)

PROGRESS IN THE DEPARTMENT OF METALLURGY

(Continued from page 14.)

of coal from all over the state already at hand for testing.

This equipment will give students in Mining and Metallurgy a fine opportunity for getting thoroughly acquainted with the methods of coal carbonization and the principles involved. There is bound to be a great demand for men trained in the principles and practice of artificial gas making for every city will need such an engineer.